Cognitive and affective predictors of treatment outcome in cognitive processing therapy and prolonged exposure for posttraumatic stress disorder

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ABSTRACT

This study examined cognitive and affective predictors of treatment dropout and treatment efficacy in Cognitive Processing Therapy (CPT) and Prolonged Exposure (PE) for PTSD. Study participants were women with PTSD from a sexual assault who received at least one session of either treatment ($n = 145$) as part of a randomized clinical trial. Results revealed that younger age, lower intelligence, and less education were associated with higher treatment dropout, whereas higher depression and guilt at pretreatment were associated with greater improvement in PTSD symptomatology. Results by treatment condition indicated that women with higher anger at pretreatment were more likely to dropout of PE and that older women in PE and younger women in CPT had the best overall outcomes. These findings have implications for efforts to enhance treatment efficacy and retention in CBT treatment protocols.

A growing body of literature suggests that cognitive-behavioral therapy (CBT) is an effective mode of treatment for posttraumatic stress disorder (PTSD). Findings indicate that 42–80% of clients will show significant improvement in PTSD symptomatology, with approximately 50–70% no longer meeting diagnostic criteria for PTSD by the end of treatment (e.g., Bradley, Greene, Russ, Dutra, & Westen, 2005; Foa et al., 1999; Foa, Rothbaum, Riggs, & Murdock, 1991; Resick, Nishith, Weaver, Astin, & Feuer, 2002; Tarrier et al., 1999). With the effectiveness of CBT for PTSD established, it is important to determine individual differences in pretreatment characteristics that influence treatment outcome so that those who are most likely to benefit from treatment can be identified and different or modified treatments can be developed for those with poorer outcomes.

Most studies that have examined factors that influence treatment outcome have focused on whether treatment results in expected reductions in PTSD symptomatology (i.e., treatment efficacy) (e.g., Cahill, Rauch, Hembree, & Foa, 2003; Cloitre, Stovall-McClough, Miranda, & Chemtob, 2004; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005; Foa, Riggs, Massie, & Yarczower, 1995; Forbes, Creamer, Hawthorne, Allen, & McHugh, 2003). However, whether participants fail to complete treatment (i.e., treatment dropout) may also be considered an important indicator of

treatment outcome, as getting an adequate dose of the intervention is often a prerequisite for successful treatment. In addition, many studies that have examined predictors of treatment efficacy have involved an exploration of the predictive value of numerous, conceptually unrelated demographic and other factors assessed as part of the study. The selection of potential predictors has rarely been guided by theoretical expectations regarding factors that should influence the outcome of the particular treatment under study.

For the purpose of the present study, we were interested in two categories of predictor variables that may be especially salient in predicting treatment outcome, conceptualized as both treatment efficacy and treatment dropout, for CBT-based treatments for PTSD. The first category reflects cognitive variables that may influence one's openness to new ways of thinking, as well as one's ability to actively engage in changing beliefs and established patterns of thinking, a key component of CBT. Three variables that were assessed in this study broadly fall within this category: level of education, intelligence, and age. Clients who are more highly educated and/or are more intelligent may be better able to learn new ways of thinking compared to less educated and less intelligent clients. Therefore, they may be more likely to follow through with treatment and benefit from treatment. Although clients who are younger may be more open to changing beliefs and established patterns of thinking than older clients (Donnellan & Lucas, 2008), and thus, may benefit more from treatment, two studies have suggested that younger clients are more likely to dropout of

treatment compared to older clients (Cloitre et al., 2004; Foa et al., 2005). Therefore, age might demonstrate a more mixed impact on treatment outcome.

A second category reflects comorbid affective states that may interfere with emotional and cognitive processing of the trauma memory, a key component of CBT-based treatments that involve recall of or exposure to the traumatic experience, including both Cognitive Processing Therapy (CPT; Resick & Schnicke, 1993) and Prolonged Exposure (PE; Foa & Rothbaum, 1998). In the present study, three affective states were assessed, namely anger, guilt, and depression. Because anger has been implicated as an impediment to successful emotional processing (Foa & Kozak, 1986), it could block recovery therapies that include recall and discussion regarding the traumatic event. High levels of guilt about the traumatic event or depression could also result in cognitive avoidance of trauma memories and reduced engagement in the trauma memory during therapy (Ehlers & Steil, 1995; Henning & Frueh, 1997; Williams & Moulds, 2007).

Previous results with respect to the impact of affective states on PTSD treatment outcome have been mixed. In a study of Vietnam veterans who all received a 12-week cognitive-behavioral group treatment program, higher levels of pretreatment anger were the strongest predictor of negative treatment outcomes nine months after treatment ended. Moreover, a subgroup of participants characterized by high anger and lower PTSD failed to benefit from treatment, whereas a low anger/high PTSD group benefited the most (Forbes et al., 2003). Another earlier study of combat veterans demonstrated that anger and guilt about combat-related trauma were related to worse outcomes in exposure therapy for PTSD (Pitman et al., 1991). Foa et al. (1995) found that clients who reported more anger prior to PE treatment benefited less from treatment than less angry clients. In contrast, Cahill et al. (2003) did not find that anger at pretreatment uniquely contributed to posttreatment PTSD scores, after factoring out pretreatment PTSD severity. In a CBT treatment study for individuals with PTSD from motor vehicle accidents, Taylor et al. (2001) determined that individuals who only partially responded were more likely to have motor vehicle accident-related anger at pretreatment, compared to full responders. In still another study (Speckens, Ehlers, Hackmann, & Clark, 2006), low anger at pretreatment was associated with greater decreases in intrusion frequency over the course of exposure. Finally, van Minnen, Arntz, and Keijsers (2002) examined a number of pretreatment affective characteristics, including depression, guilt, and anger, to determine possible predictors of treatment efficacy and dropout in PE and failed to find any that were statistically significant.

The majority of studies that have examined predictors of PTSD treatment outcome have either focused on a single form of treatment, most commonly PE, or because many treatment studies have been relatively small, have combined treatments into one larger sample. Yet, collapsing various treatment conditions into one sample or looking solely at one form of treatment may obfuscate the real possibility, given the theoretical distinctions between various psychosocial treatments, that there may be different predictors of outcome depending on the treatment. Knowledge about differential predictors would be important in determining whether different treatments are more effective for different people and could help with treatment matching efforts to ensure optimal level of treatment response. To our knowledge, the only study that has examined predictors of treatments separately is that of Taylor (2003). In a sample of 45 treatment completers randomized to exposure therapy, eye movement desensitization and reprocessing, or relaxation training, Taylor found that greater levels of reexperiencing symptoms at pretreatment were associated with worse outcomes for individuals in relaxation training but not the

other two conditions. Although that study represents an attempt to look at differences by treatment condition, it was limited by its small sample size.

The use of analytical techniques, such as regression-based analyses, that exclude individuals with missing data further adds to the complexity of the literature. Missing data is an extremely common occurrence in treatment outcome research and the failure to accommodate the impact of missing data on study results can lead to results that are misleading and inaccurate (McArdle & Bell, 1998; Muthén & Curran, 1997). In the present study, we were able to accommodate missing data in our analyses of predictors of treatment efficacy, such that data were analyzed for all clients who completed more than 75% of their treatment (i.e., those classified as "treatment completers"), regardless of whether they provided follow-up data.

The purpose of the present study was to examine cognitive and affective predictors of treatment outcome, both dropout and reductions in PTSD symptom severity at posttreatment and follow-up, in two evidence-based treatments for PTSD, CPT and PE, secondary to a randomized controlled trial (Resick et al., 2002). Guided by a theoretical framework, and using a random coefficients regression framework that accommodates missing data for our analyses of predictors of treatment efficacy, as well a larger sample size than has been available in many previous studies, we hoped to overcome some limitations of previous research in this area. The current study examined a sample of 145 women with PTSD as a result of a completed rape. All women were randomized to receive either CPT or PE. We examined six predictors: age, years of education, intelligence, depression, anger, and guilt. We hypothesized that: 1. Higher age, lower intelligence and lower education level would be associated with worse outcomes in terms of both willingness to engage in treatment (treatment dropout) and treatment efficacy, and 2. Higher levels of depression, anger, and guilt, would be associated with worse outcomes in terms of both dropout and treatment efficacy. Given that this was the first study with a large enough sample size to meaningfully examine predictors of the two treatments differentially, we had no specific hypotheses about differential predictors and therefore, these analyses were considered to be exploratory.

Method

Participants

Procedures are described in detail in Resick et al. (2002). Briefly, female participants were included if they had experienced at least one discrete incident of completed rape (oral, anal, or vaginal) in childhood or adulthood, they met criteria for PTSD, and at least three months had passed since their most recent trauma. Exclusion criteria from the study included apparent current psychosis, suicidal intent, current self-injurious behavior, current substance dependence, illiteracy, or ongoing trauma (stalking or abusive relationship). Women with prior substance dependence were included if or when they had been abstinent from the substance(s) for six months.

Two hundred sixty-seven women were assessed for possible participation and 171 women comprised the intent-to treat sample (ITT). Upon entry to the study, participants were randomized to PE, CPT, or a waitlist for six weeks. Following the wait, the delayed treatment participants were randomly assigned to either CPT or PE. There were no differences in pretreatment PTSD and depression scores between the three treatment conditions (Resick et al., 2002). For this study, the delayed treatment participants were folded into the main treatment samples. There were no initial differences or treatment outcome differences between those who received

immediate treatment and those who were initially assigned to the waitlist control group.

All participants who completed at least one active treatment session (i.e., either one session of CPT or PE) were included in the current study ($n = 145$). Seventy-two participants were in CPT and 73 were in PE. Average age of the sample at pretreatment was 31.7 years ($SD = 9.8$; range: 18-70). The majority of the sample (74.5%) was White, with 21.4% African American, and 4.1% representing other ethnicities. Approximately half (52.2%) had an annual income of less than $20,000 per year. Average years of education was 14.6 ($SD = 2.3$, range: 8–24 years). Mean IQ score was 98.99 ($SD = 9.29$). There was a great deal of variability in time since the rape (range: 3 months to nearly 33 years; $M = 8.4$ years, $SD = 8.2$ years). There were no significant differences between the two treatment conditions on any of these demographic variables.

Measures

Clinician Administered PTSD Scale (CAPS; Blake, Weathers, Nagy, & Kaloupek, 1995)

The CAPS is a widely used interview-based diagnostic instrument for PTSD. This measure yields a total severity score, which is computed by summing the frequency and intensity scores, rated on a scale of 0 (low) to 4 (high) for both frequency and intensity, for all 17 items. The CAPS has been shown to have excellent psychometric properties (see Weathers, Keane, & Davidson, 2001 for a review). For the current study, reliability coefficients of the CAPS total severity scores were .85 at pretreatment, .90 at posttreatment, .92 at 3-mo follow-up, and .92 at 9-mo follow-up. The total severity score at all four time points was used as the dependent variable in all random coefficients regression analyses.

The pretreatment scores of the following measures were used in this study.

Quick Test (QT; Ammons & Ammons, 1962)

The QT is a 50-item test of general intelligence that requires no reading, writing, or speaking. Participants look at cardboard plates with four line drawings and indicate which drawing best illustrates the meaning of a given word. The QT has been shown to correlate ($r = .82$) with the WAIS full scale IQ (Maloney, Steger, & Ward, 1973). It was used in this study at pretreatment to obtain an estimate of intelligence.

Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)

The BDI is a widely used 21-item self-report questionnaire that can be used to assess cognitive and vegetative symptoms of depression. Test-retest reliability in psychiatric patients ranges from .46 to .86, with .65 test-retest reliability over a one-week period for depressed patients (Beck, Steer, & Garbin, 1988). Correlations with clinician ratings of depression ranged from .62 to .66 in a sample of female physical and sexual assault victims (Foa, Riggs, Dancu, & Rothbaum, 1993). Internal consistency for the BDI ranges from .73 to .92 with a mean of .86. (Beck et al., 1988). In this study, the alpha coefficient was .87.

State Trait Anger Expression Inventory (STAXI; Spielberger & Sydeman, 1994)

The STAXI is a 44-item instrument that includes scales to assess the experience, expression, and control of anger. The STAXI scales have demonstrated good internal consistency and good convergent validity with other measures of anger-hostility (Spielberger, Jacobs, Crane, & Russell, 1983). The primary trait anger scale, designed to assess one's overall propensity to experience anger, was used in this study because we were interested in assessing characteristic levels of anger likely to be relevant across a variety of different situations. Total scores on this scale range from 10 to 40, with higher scores indicating greater levels of anger. In this study, the alpha coefficient for this scale was .86.

Trauma Related Guilt Inventory (TRGI; Kubany et al., 1996)

The TRGI is a 32-item inventory with scales to assess global guilt and guilt cognitions, in addition to a number of subscales. Of most relevance for this study is the global guilt scale given our interest in levels of affective states, rather than cognitions per se. A series of studies documented an alpha coefficient ranging from .89 to .91 for this scale (Kubany et al., 1996). Construct, criterion-related, and discriminant validity have been established with samples of Vietnam combat veterans and battered women. In this study, the alpha coefficient was .94 for global guilt.

Treatments

Both treatments were delivered by the same eight female doctoral level therapists. Therapists were trained in both therapies by the treatment developers (Resick and Foa) and assignments to therapy cases were made to ensure a balance across treatment conditions. Close supervision and independent adherence raters were employed to assure that the two therapies were distinctly implemented. Both treatments consisted of 13 h of therapy.

Cognitive Processing Therapy

CPT is a combination treatment which involves written exposure about the traumatic event but is predominantly a cognitive therapy. The treatment was delivered over twelve sessions and followed the manual as written by Resick and Schnicke (1993). CPT includes psychoeducation, written exposures about the traumatic event, and cognitive restructuring with regard to beliefs about the meaning of the event and the implications of the trauma for one's life. In the second half of the treatment, clients are asked to focus on disruptions in beliefs about safety, trust, power/control, esteem, and intimacy which may result from traumatic exposure.

Prolonged Exposure (Foa & Rothbaum, 1998)

PE is guided by Emotional Processing Theory (see Foa, Huppert, & Cahill, 2006) which suggests that PTSD symptomatology is maintained primarily by avoidance of trauma cues as well as negative cognitions about the self, the world, and one's reaction to the trauma. The standard PE protocol, as detailed by Foa and Rothbaum (1998), including the four components of education/rationale, breathing retraining, behavioral exposures, and imaginal exposures, was followed for this study. The majority of the nine sessions (sessions 3–9) included in this treatment involve imaginal exposure of the traumatic event for 45–60 min of the 90-minute session.

Data analysis

To determine how those who prematurely dropped out of treatment differed from those who completed treatment, treatment dropout, defined as completing less than 75% of the treatment sessions (less than 9 of 12 sessions for CPT; less than 7 of 9 sessions for PE), was regressed on all predictor variables in a series of logistic regressions. Effect sizes for these results are presented in terms of odds ratios. Predictors of treatment efficacy for those individuals who completed treatment were then analyzed. Due to the longitudinal nature of our design which produced a multilevel data structure (repeated measures nested within individuals), hypotheses about predictors of treatment efficacy were tested using a random coefficients regression framework (see Raudenbush, 2001) with

the Hierarchical Linear Modeling statistical package (HLM6; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). An advantage of this type of analysis is that it handles unbalanced designs efficiently, which allows the number of observations to vary across participants.

For these analyses, time of the assessment was considered a Level 1 variable with the outcome being CAPS severity score. The time measurement used in the modeling was the exact number of days from the first appointment at which assessments occurred (i.e., pretreatment appointment was Day 0 and all subsequent appointments were calculated as number of days from this initial date). Because the four time points occurred at pretreatment, posttreatment, 3 months, and 9 months posttreatment, it was assumed that the greatest rate of change would occur between pretreatment and posttreatment, thus the slopes were specified to be curvilinear in shape. A natural logarithmic transformation of time was performed prior to the individual regression analyses (Mosteller & Tukey, 1977; Singer & Willett, 2003). This was verified by comparing a curvilinear model to a linear model and demonstrating that the curvilinear model was indeed superior in terms of reliability estimates for the slope coefficients, effect size estimations, and deviance statistics (Raudenbush & Bryk, 2002; Singer & Willett, 2003).

The six predictors constituted the Level 2 variables in the multilevel analyses. These included the cognitive variables (age, years of education, and IQ score) and variables that reflect comorbid affective states (depression, trait anger, and global guilt). First, a series of analyses were run for the entire sample to determine whether any of these predictors influenced the slope values. The variances of the intercept and slope and the covariance between them were specified as free parameters. Although results for intercepts were beyond the scope of the present study, we refer back to these results in cases where variables demonstrated significant effects on slope to provide a context within which to interpret change over time. A full table that includes results for intercepts is available from the first author. Next, to determine whether there was a significant interaction with treatment type, another series of analyses were computed with three variables entered at level 2: the centered predictor, treatment condition (dummy coded as −1 for CPT and 1 for PE), and the interaction term between the centered predictor and treatment condition. If a significant interaction was found for the slope, indicating that rate of change over time was dependent on the level of the predictor, the 3-way interactions were modeled according to specifications and calculations set forth by Preacher, Curran, and Bauer (2006) using the following website: http://people.ku.edu/~preacher/interact/hlm3.htm. Effect sizes were also determined by calculating Cohen's d for each analysis. Cohen (1988) specifies the following interpretations of d: .2 is a small effect, .5 a medium effect, and .8 or greater constitutes a large effect size.

Results

Predictors of treatment dropout

In the CPT group, 16 women (22.2%) dropped out of treatment; 17 women (23.3%) dropped out of PE. The dropouts in the CPT condition completed a median of 4 sessions out of 12 (range 1–8; $M = 3.81$, $SD = 1.98$) and the dropouts in the PE condition completed a median of 3 sessions out of 9 (range 1–6; $M = 2.88$, $SD = 1.45$). These findings indicate that approximately half of the individuals who dropped out of treatment in both conditions completed less than one-third of the therapy sessions. All but three of the participants considered treatment completers attended all of their sessions (two CPT participants completed 9 and 11 of their 12 sessions, one PE participant completed 7 of 9 sessions). There were

Table 1
Logistic regression analyses examining predictors of treatment dropout.

	B	SE	χ^2	p	OR
Cognition-Related Variables					
Age	−.05	.02	4.98	.02	.95
Age × treatment	−.01	.05	.02	ns	.99
Education	−.22	.10	4.58	.03	.81
Education × treatment	.06	.21	.09	ns	1.06
IQ	−.08	.02	10.03	.002	.92
IQ × treatment	.04	.05	.50	ns	1.04
Comorbid Affective States					
Depression	.00	.02	.00	ns	1.00
Depression × treatment	.03	.04	.59	ns	1.03
Anger	.03	.04	.90	ns	1.03
Anger × treatment	−.18	.08	5.42	.02	.84
Guilt	−.22	.18	1.46	ns	.80
Guilt × treatment	−.01	.36	.00	ns	.99

Note: Individual ns vary by analysis due to missing values at pretreatment for some cases on some measures (range: 136 to 145).

no significant differences between women who dropped out and those who completed therapy with regard to their initial PTSD severity on the CAPS, $t(143) = -.28$, $p > .05$. Results of the logistic regression analyses examining cognitive and affective predictors of dropout from treatment are displayed in Table 1. All three cognition-related variables demonstrated significant negative associations with dropout, suggesting that younger age, fewer years of education, and lower intelligence were associated with a higher rate of dropout. Effects did not vary by treatment condition.

In contrast, comorbid affective states (i.e., depression, trait anger, global guilt) did not predict treatment dropout for the whole sample. Effects did not differ for treatment condition, with one exception. There was a significant interaction between treatment condition and pretreatment trait anger, suggesting that anger was differentially related to treatment dropout for the two treatments. Individuals who dropped out of PE had higher trait anger scores at pretreatment compared to those who dropped out of CPT (see Fig. 1).

Predictors of treatment efficacy

Data for the 112 individuals who completed more than 75% of their treatment sessions were then analyzed to determine cognitive and affective predictors of treatment efficacy (see Table 2). None of the three cognitive variables demonstrated main effects on treatment efficacy. However, there was a significant interaction between age and treatment condition, suggesting that age was differentially related to treatment efficacy for the two treatments[1]. To better understand this interaction, a graph was constructed with separate regression lines representing four distinct groups. These groups were: lower age (one standard deviation below mean) assigned to CPT; higher age (one standard deviation above mean) assigned to CPT; lower age assigned to PE; and higher age assigned to PE. The y-axis represents the predicted CAPS score based on the HLM regression equations. As shown in Fig. 2, these results suggest that younger women in CPT had the best outcomes over time, followed closely by older women in PE. The group with the smallest slope (lowest rate of change over time) was younger women in PE.

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[1] To rule out the alternative explanation that it was length of time since the assault, rather than age, that was associated with treatment efficacy, supplementary analyses were performed. Although age and time since assault were correlated, results indicated that time since assault was not significantly related to dropout or treatment efficacy. Therefore, we determined that it was not necessary to control for time since assault in these regression analyses.
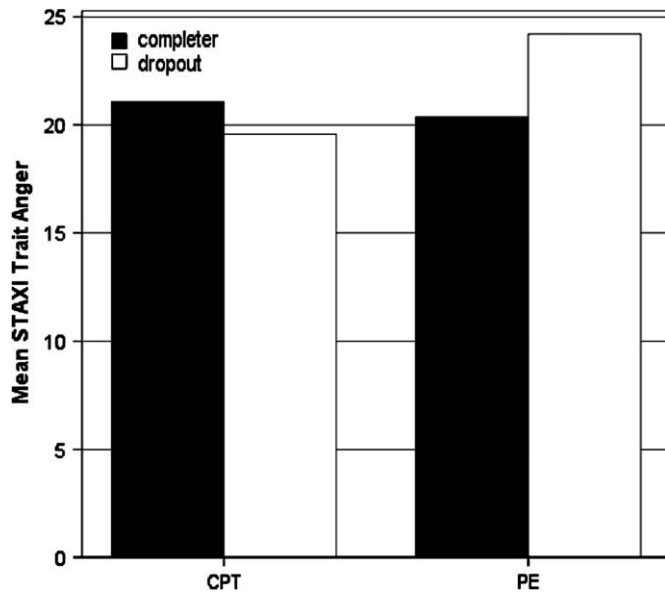
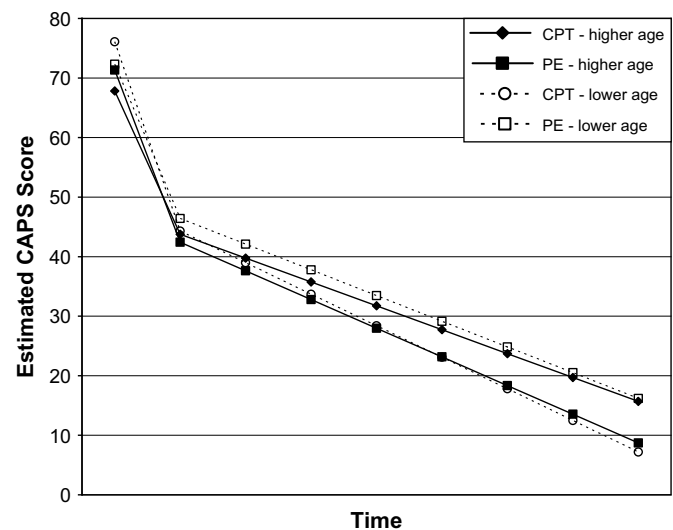**Fig. 1.** STAXI trait anger by treatment condition and dropout status.

Fig. 2. CAPS outcome as a function of age and condition for treatment completers. *Note.* Graph represents regression lines based on HLM analyses. For illustration purposes, lower age and higher age were determined by one standard deviation above and below the mean. The *y*-axis represents the predicted CAPS score based on the HLM regression equations.

In contrast, two of the three comorbid affective states demonstrated main effects on treatment efficacy. Those individuals higher in depression and global guilt showed greater improvement in PTSD symptomatology as a function of therapy compared to those who started out with lower levels of depression and global guilt. Further probing of this finding via the examination of predictors of initial PTSD status indicated that these individuals also had higher pretreatment PTSD scores. Therefore, these differences may reflect greater response to treatment as a function of initial severity. These variables did not interact significantly with treatment condition, suggesting that their relationship to treatment outcome did not vary for the two types of therapy examined in this study.

Discussion

This study examined potential predictors of treatment outcome in two evidence-based treatments for PTSD: CPT and PE. We hypothesized that several cognitive and affective variables would be related to both treatment dropout as well as treatment efficacy.

Table 2
Hierarchical linear modeling analyses examining predictors of treatment outcome (*n* = 112).

	B	SE	t	p	d
Cognition-Related Variables					
Age	.03	.04	.72	ns	.14
Age × treatment	−.09	.04	−2.14	.03	.41
Education	−.04	.20	−.19	ns	.04
Education × treatment	−.02	.20	−.08	ns	.02
IQ	−.02	.05	−.35	ns	.07
IQ × treatment	.04	.05	.90	ns	.17
Comorbid Affective States					
Depression	−.11	.04	−3.05	.003	.59
Depression × treatment	.01	.04	.27	ns	.05
Anger	−.00	.06	−.02	ns	.00
Anger × treatment	.03	.07	.38	ns	.07
Guilt	−1.15	.30	−3.80	<.001	.74
Guilt × treatment	.11	.30	.35	ns	.07

Note: Individual ns vary by analysis due to missing values at pretreatment for some cases on some measures (range: 103 to 112).

Overall, results supported our hypothesis that cognitive variables would influence dropout; specifically, both lower intelligence and education were related to a greater likelihood of premature termination. However, in contrast with expectations, none of the cognitive variables demonstrated main effects on treatment efficacy. Further, comorbid affective states did not appear to affect treatment dropout, but depression and guilt appeared to impact treatment efficacy in an unexpected direction. There were two significant predictor by treatment condition interactions. Each of these are discussed below.

Consistent with several prior studies, but in contrast with our findings for the other cognitive variables, age was negatively related to dropout (Cloitre et al., 2004; Foa et al., 2005). Thus, it seems relevant for treatment providers to be aware that younger women may be more likely to end treatment prematurely and perhaps do more to strengthen their commitment to treatment at its onset. More research is needed to determine what it is about younger age that contributes to dropout. It may be that younger clients have more competing demands on their time or are more ambivalent about treatment than older clients. In turn, this may override any potential benefit of greater openness to changing beliefs and established patterns of thinking on this indicator of treatment outcome. Given that this finding has now been replicated, it will be important to turn efforts toward determining underlying causes. Another relevant direction for future work will involve replicating this finding in a male sample. The three studies that have addressed this research question have all been limited to female participants, and the results may not apply equally well to men.

In contrast with expectations for the treatment efficacy results, both depression and global guilt at pretreatment demonstrated main effects on treatment efficacy in an opposite direction than expected. Interestingly, although higher scores on each were related to higher initial PTSD symptomatology, individuals with higher depression and guilt demonstrated a greater relative reduction in PTSD over time, thus playing "catch up" with their counterparts with lower degrees of depression and guilt. This finding highlights the effectiveness of both treatments for individuals with more severe PTSD, as well as their effectiveness for

individuals who have comorbid symptoms. Results do not appear to support the hypothesis that these affective states would interfere with successful processing of trauma memories or cognitive work.

No significant main effect on treatment efficacy was found for anger. Including the present study, there have now been three studies that have not found any effect of anger on treatment success (Cahill et al., 2003; van Minnen et al., 2002) and four studies (Foa et al., 1995; Forbes et al., 2003; Speckens et al., 2006; Taylor et al., 2001) that found that higher anger was associated with worse outcomes. One potential explanation for some of the contradictory findings is that both the Foa (Foa et al., 1995) and Cahill (Cahill et al., 2003) studies included a measure of *state anger* at pretreatment which may vary as a result of situational factors. Because our goal was to assess characteristic levels of anger that are likely to be relevant across a variety of different situations, we used the measure of *trait anger* for the current study. The van Minnen et al. (2002) study used both state and trait measures of anger and Forbes et al. (2003) used a measure of tendency to be angry toward other persons. Speckens et al. (2006) asked about general anger and irritability over the previous month. On the other hand, Taylor et al. (2001) used a measure of anger at others responsible for the car crash. Future studies will need to clarify and provide justification for the measurement of anger used, in light of the discrepancies in the field in assessing this affective condition.

One of the aims of the current study was to explore whether there were differential cognitive and affective predictors for the two treatment conditions. In terms of dropout, we found a significant interaction for anger and treatment condition suggesting that higher trait anger is more strongly related to dropout in PE compared to CPT. This result was evident despite the fact that, overall, completers did not differ from dropouts on levels of trait anger which suggests a unique relationship between PE, anger, and dropout. As described earlier, the current literature on client anger and PE is mixed, and most research has focused on treatment efficacy, not dropout rates. To our knowledge, only van Minnen et al. (2002) examined the effects of pretreatment anger on *dropout* in PE. In contrast to their null finding, we found that pretreatment trait anger, as measured by the STAXI, was associated with dropout. This result has implications for clinical work. If replicated, individuals who are high in trait anger may need to be identified prior to starting treatment and their commitment to PE may need to be strengthened to reduce the risk of premature termination. Alternatively, it's possible that clients with high trait anger at pretreatment would be better served by an alternative treatment, such as CPT.

In terms of treatment efficacy, there was one significant interaction between age and treatment condition. It appears that younger age in CPT and older age in PE are related to the best outcomes, whereas older age in CPT and younger age in PE are related to relatively worse outcomes (though all groups demonstrate symptom reduction over time). It is possible that differences in the focus of the two different cognitive-behavioral therapies account for this finding. More specifically, it may be that as people age, they have more difficulty changing long standing cognitions and instead benefit from greater trauma exposure and emotional processing or longer cognitive therapy with more repetitions. To some extent, this interpretation is consistent with the idea raised earlier that both the willingness and ability to learn new ways of thinking may be an important factor in understanding who benefits most from different cognitive-behavioral treatments. This finding is intriguing and awaits replication and explanation.

The finding that age interacted with treatment condition to predict change over time underscores the importance of examining different treatments separately. That is, results for the entire sample demonstrated no effect of age on treatment efficacy.

Investigating this relationship by treatment condition, however, yielded a potentially important finding that would have otherwise been missed. Because different treatments have different theories underlying their proposed mechanisms of change, it seems necessary to examine potential differences in associations based on treatment type.

With the exception of age, there were no differential predictors of efficacy for the two treatments that were examined in this study. We believe this underscores the robustness of both treatments in their effectiveness for treating PTSD within this population. The effectiveness of these treatments may have also contributed to the fact that there were few unique predictors of change over time. Because nearly all the participants were improving with treatment, this naturally cuts down on the amount of variability in PTSD scores over time. It is also important to note that although this study represents an advance over other studies with small sample sizes, the sample of sexual assault victims is still limited in its generalizability.

This study included only women in treatment for PTSD as a result of a rape and, therefore, results may not apply to other PTSD populations. In addition, future research would benefit from the inclusion of stronger measures of cognitive functioning than were available for this study. Although age, intelligence, and education served as useful indicators of openness to experience in this study, it will be important to include a more direct measure of this construct in future research. Of particular concern is the interpretation of the results related to age. While younger age has been found to be related to greater openness to new ways of thinking (Donnellan & Lucas, 2008), effects for age are likely to be most robust in samples that include a greater proportion of older women than were included in this study. Furthermore, we did not have data for individuals after they dropped out of treatment. It is possible that some individuals could have dropped out of treatment because they experienced significant improvement with a shorter course of therapy (Monson et al., 2006; Resick et al., 2002,, 2008). Thus, dropout may not always be a sign of poor treatment outcome. However, given that half of the individuals who dropped out of treatment in both conditions completed less than one-third of the therapy sessions, it is unlikely that significant improvement preceded a great number of cases. Future studies should examine this issue more thoroughly.

Another point to mention is that individuals who dropped out of treatment were, by definition, omitted from analyses of predictors of treatment efficacy. This exclusion necessarily limits variability for the variables found to be significant for dropout (intelligence, education, and trait anger) for the efficacy analyses. Thus, the examination of the impact of intelligence, education, and anger on treatment efficacy likely excludes those with the lowest levels of intelligence and education and highest levels of trait anger. However, to the extent that these individuals are not willing to complete treatment, then the question of how their levels of intelligence, education, or anger would impact treatment efficacy might be considered somewhat premature. More research is needed to parse out the differential impact of these variables on dropout and treatment efficacy.

It is imperative that other studies replicate these findings. At this point, it is premature to say, for example, that younger women should be given CPT while older women should be given PE or that women with high trait anger should not be treated with PE. However, this study represents an important first step in its application of a sound theoretical framework to suggest hypotheses regarding which treatments work for whom, providing results that can highlight potential areas for improvement. This knowledge can be used to inform treatment decisions and ultimately produce better outcomes.

Acknowledgments

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